Statewide Dual Credit for Introduction to Ornamental Horticulture (AGRI 1030) (Greenhouse Management #5954)

Forty-seven high schools from across Tennessee are participating in the statewide Greenhouse Management dual credit pilot for the 2013-14 school year. As one of the pilot sites, your Greenhouse Management students have the opportunity to credits for the college-level course, Introduction to Ornamental Horticulture, which will be accepted by any public postsecondary institution in Tennessee.

This document includes the following resources and instructional materials for the course:

LEARNING OBJECTIVES

The following learning objectives were created specifically for the Greenhouse Management – Introduction to Ornamental Horticulture dual credit course. The aligned textbook is: *Ornamental Horticulture, Science, Operations & Management*. Fourth Edition, Author: Jack Ingels. Delmar Cengage Learning, 2009. Chapters identified below refer to this textbook.

Topics Covered:

1. The Green Plant (Chapter 1)
2. The Soil (Chapter 3)
3. Plant Reproduction (Chapter 5)
4. Plant Pests and Their Control (Chapter 6)
5. Interior Uses of Plants (Chapter 8)
6. Landscape Design (Chapter 9)
7. Turf Selection, Establishment, and Maintenance (Chapter 13)
8. Techniques of Plant Propagation (Chapter 14)
9. Greenhouses and Other Growing Structures (Chapter 19)
10. Greenhouse Production Techniques (Chapter 20)
11. Beginning and Promoting an Ornamental Horticulture Business (Chapter 22)
12. Human Relations: Personnel Management and Customer Sales (Chapter 23)

1) The Green Plant

a) List the important roles played by green plants in our lives and the earth's ecosystem.

b) Describe the natural classification system for the plant kingdom.

c) List the parts of a typical higher green plant and describe their functions.

d) Describe how plants grow.

e) Define the process of photosynthesis, respiration, and transpiration.

f) Describe the environmental factors that affect plant growth.

2) The Soil

a) State how and why soils differ.

b) List the components of soil, major soil separates, and the soil textures they create.

c) List the 17 elements essential to plant growth and their functions and symptoms of their deficiency in plants.

d) Define good soil structure and list the factors that promote it.

e) Define soil acidity and alkalinity in terms of pH.

f) Compare the qualities of fertilizers.

g) Describe how essential elements in the soil become available for plant use.

3) Plant Reproduction

a) Describe the characteristics of sexual and asexual reproduction in plants.

b) Describe the processes of mitosis and meiosis.

c) List the common methods of propagating plants.

d) Recognize the contributions of Mendel to the science of genetics.

e) Discuss methods of plant improvement.

4) Plant Pests and their Control

a) State the major causes of injury to plants.

b) Characterize insects and groups of pathogens as plant pests.

c) List common symptoms of injured plants.

d) List the principles of pest control.

e) Describe the types of pesticides and their safe use.

f) Explain the concept of integrated pest management.

5) Interior Uses of Plants

a) Discuss the current status of the interior foliage plant industry.

b) List problems unique to the interior use of plants.

c) Describe the role of light duration, quality, and intensity.

d) List the characteristics of a good growing medium.

e) Describe the steps in installation, watering, and drainage.

f) Describe the working relationship between architects, landscape architects, and maintenance professionals.

6) Landscape Design

a) List 3 influences on contemporary landscape design.

b) Define the objectives of contemporary landscaping.

c) Define the outdoor room concept.

d) Select plants to fill a role in the landscape.

e) Select enrichment items and construction materials for the landscape.

f) Recognize graphic tools and techniques used to illustrate a landscape plan.

g) Create a residential landscape plan that incorporates principles of design.

7) Turf Selection, Establishment, and Maintenance

a) Select appropriate turfgrasses for particular landscape uses.

b) Explain how grass seed mixtures vary.

c) Interpret a grass seed analysis label.

d) Describe common methods of turf installation.

e) Explain how a spreader is calibrated.

f) Outline a maintenance program for professional lawn care.

8) Techniques of Plant Propagation

a) Prepare plant propagation media.

b) Prepare total environments for plant propagation.

c) Demonstrate techniques of propagation by the use of cuttings, seeds, plugs, grafting, budding, and layering.

d) Describe techniques of tissue and organ culture.

9) Greenhouses and Other Growing Structures

a) List and compare types of growing structures.

b) List the characteristics of various greenhouses and shade house coverings.

c) List advantages and disadvantages of steam heat, hot water heating, and unit heaters in greenhouses.

d) Describe methods of ventilating or cooling greenhouses.

e) Describe the latest methods employed to conserve energy in greenhouses.

f) Diagram three common methods of arranging greenhouse benches.

10) Greenhouse Production Techniques

a) Explain the need for a crop production cycle.

b) Explain how and why greenhouse root media vary.

c) Describe four methods of pasteurizing growing media.

d) List three reasons for frequent testing of greenhouse soil.

e) List and describe the containers used in greenhouse production.

f) List the methods of reproduction used for greenhouse crops.

g) Label crops on a greenhouse bench.

h) Describe methods of spacing, watering, and fertilizing greenhouse crops.

i) Describe techniques of integrated pest management in greenhouses.

j) Plan production schedules for a representative sampling of greenhouse crops.

11) Beginning and Promoting Ornamental Horticulture Business

a) Describe and compare three legal forms of business operation

b) Explain the value of a market survey

c) List sources of capital for new and established businesses

d) List factors to be considered in choosing a business site

e) Draw up a physical plant layout plan and a staff organization chart

f) Outline the major laws and regulations that affect horticulturists

g) Describe the methods, values, and limitations of advertising

h) List characteristics of effective advertising

i) List characteristics of effective displays

12) Human Relations: Personnel Management and Customer Sales

a) List the characteristics of a good personnel manager

b) List the characteristics of a good salesperson

c) Describe and effective sales procedure

TENNESSEE DEPARTMENT OF EDUCATION
FIRST TO THE TOP

STUDY GUIDE

The following questions accompany the learning objectives for the dual credit Greenhouse Management – Introduction to Ornamental Horticulture course and can be used as a study guide for the challenge exam.

1) The Green Plant

1. What are 5 things that Green Plants provide for us?
2. The plants of the world include a rich array that may be either _____ or _____.
3. What does the classification system attempt to do?
4. Define the following:
    - Binomial nomenclature
    - Macroscopic anatomy
    - Roots
    - Stems
        - Xylem
        - Phloem
        - Cambium (what it produces)
    - Leaves
        - Stomata
        - Transpiration
    - Leaf color
        - Chlorophyll
        - Xanthophyll
        - Carotene
        - Anthocyanins
    - Cones
    - Flowers
        - Complete
        - Incomplete
        - Perfect
        - Imperfect
        - Monoecious
        - Dioecious
2. The cell is the basic structural unit of all living organisms except for what?
3. What is the main distinction between plant and animal cells?

4. What are meristematic cells? Where are they found, or concentrated?
5. What is the difference between maturity and juvenility?
6. Define the following major plant processes and what plants need for growth:
    - Photosynthesis
    - Respiration
    - Transpiration
    - Translocation
    - Phototropism
    - Photoperiodism
    - Auxin
7. Light is the _____ that permits all life on earth to exist.

2) The Soil

1. Define the following:
    - Soil
    - Dirt
    - Soil Profile
    - Humus
    - Green Manure
    - Sedentary
    - Transported Soils
        - Colluvial
        - Alluvial
        - Aeolian
        - Glacial till
    - Soil Texture
    - Loam
    - Macronutrients
    - Micronutrients
    - Leaching
    - Aggregates
    - Soil structure
    - Fertilizer
2. Draw and label the layers of a Soil Profile.

3. What type of soils are usually the best agricultural soils?
4. List the 4 Soil Separates. Give the sizes of each. Place a star beside the one that possesses the greatest surface area.
5. List the 16 essential elements. Place a star beside the macronutrients.
6. A pH of less than 7.0 is called _____. They have more _____ ions than _____ ions.
7. A pH of 7.0 is called _____.
8. A pH of more than 7.0 is called _____. They have more _____ ions than _____ ions.
9. Which 3 soil elements are used in greatest quantity by plants? Give 3 facts about each element.
10. List 5 examples of Organic Fertilizers.

3) Plant Reproduction

1. Define the following:
    - Reproduction
    - Propagation
    - Sexual Reproduction
        - Gametes
        - Zygote
        - Meosis
    - Asexual Propagation
        - Mitosis
        - Scarification
        - Stratification
        - Clone
        - Ramet
    - Mutation
    - Plant breeding
    - Phenotype
    - Genotype
    - Lethal gene
    - Hybrid vigor

2. When a seed is formed, what propagation method is used?

3. When an exact duplicate of a plant is desired, what propagation method is used?
4. List and define twelve asexual reproduction techniques (e.g. Runners, Apomictic Embryos)
5. What is the most common method of asexual reproduction?
6. Briefly describe Gregor Mendel's work.

4) Plant Pests and their Control

1. Define the following:
    - Infectious
    - Infestious
    - Parasite

2. Define the following specialized branches of Biological Science:
    - Entomology
    - Plant Pathology
    - Bacteriology
    - Mycology
    - Virology
    - Nematology
    - Weed science

3. Briefly define and describe the anatomical features of insects:
    - The exoskeleton
    - The Head
    - Legs
    - Wings
    - Digestive System
    - Respiratory System
    - Nervous System (define 'ganglia')
    - Reproductive System

4. What is metamorphosis? List the complete 4 stages of development in order, and briefly describe what happens in each stage.
5. Define the following words associated with Plant Diseases:
    - Symptoms

- Pathogens
- Host plant
- Inoculum
- Site of infection
- Infested
- Infected
- Etiolation
- Chlorosis
- Necrotic

6. What is a weed?
7. Define the following words associated with Pest Control:
    - Exclusion
    - Eradication
    - Protection
    - Resistance
    - Adjuvant
    - Herbicide
    - Pheromone

5) Interior Uses of Plants

1. What types of plants have proven to be the most successful indoor plants? Why?
2. What are 6 adjustments that plants must make when used indoors?
3. Define the following words related to light and interior plantings:
    - Lux
    - Footcandle
    - Acclimatization
    - Minimum light intensity
    - Senesce
    - Abscise
    - Light-intensity acclimatization
    - Light quality
    - Nanometer
    - Uplights

4. In Light quality, describe the visible light spectrum's colors and a plant's use of the different colors (which ones are important and which ones are not?).
5. What is the most important of all light sources for plants?
6. More interior plant deaths result from _____ than for any other reason.
7. The need to water a planting can be determined by what 2 methods?
8. What does shallow watering encourage?
9. What 2 additives are in most public drinking water? Will these additives harm interior plants?
10. Why do houseplants not need fertilization as often as outdoor plants?
11. What happens when indoor plants get too much nitrogen?
12. In what form are inorganic fertilizers applied to large interior plantscapes?
13. What is seldom a problem for outdoor plants but can cause problems for interior plantscapes?
14. Can air pollution be escaped by bringing plants indoors?
15. What reduces the amount of dust in an interior plantscape?
16. Because of a plant's reduced rate of growth, _____ will not be extensive.
17. What is necessary in interior plantings where growth is allowed?
18. Which is the more common problem for interior plantings – insects or diseases?
19. Name the 13 most common pest problems of interior foliage plants.
20. The only real defense against damage and abuse is _____ and _____.
21. A successful interior planting of a community building requires the expertise of what 7 professions?
22. By what 2 ways is the success of the plantscape measured?
23. Describe the future outlook of the Interior Plantscaping industry.

6) Landscape Design

1. What 3 major influences have shaped American attitudes toward landscaping?
2. Define the following words related to Landscaping Today and the Outdoor Room:
    - Landscape Design
    - Site Analysis
    - Topography

- Geology
- Hydrography
- Outdoor Room Concept

3. Describe the following words related to Principles of Design:
    - Simplicity
    - Rhythm and Line
    - Balance
        - Symmetrical
        - Asymmetrical
        - Proximal / Distal
    - Focalization of Interest
    - Proportion

4. Draw the 3 types of Balance.
5. Describe the following words related to Selecting Plants for Landscapes:
    - Architectural Elements
    - Engineering Elements
    - Aesthetic
    - Hardiness

6. Briefly describe the following words related to Designing Plantings:
    - Corner Plantings
    - Incurve
    - Outcurve
    - Line Plantings
    - Foundation Plantings

7. What is a Hard Paving? Give 3 examples.
8. What is a Soft Paving? Give 3 examples.
9. A landscape design begins as an _____ in the mind of a designer.
10. The landscape designer communicates in the language of _____.
11. The landscape designer uses many of the same tools used by a _____.
12. What is a Plan View?
13. What are 3 advantages to the Plan View?

14. What is 1 disadvantage of the Plan View?

7) Turf Selection, Establishment, and Maintenance

1. Give examples of each of the following major turf categories of use:
    - Residential
    - Commercial
    - Municipal
    - Recreational
2. What is a monocotyledon?
3. Are most turfgrasses perennial or annual?
4. Define the following Growth Habits:
    - Rhizome-producing
    - Stolon-producing
    - Bunch-type
5. Define Leaf Texture. Which is generally more attractive: fine-textured or coarse textured?
6. A pound of Kentucky Bluegrass has _____ seeds, planting _____ square feet of lawn.
7. A pound of Tall Fescue has _____ seeds, planting _____ square feet of lawn.
8. Most grasses do well in soil that is _____ fertile, neutral to slightly _____, well _____, and moist but _____.
9. Cool season grasses favor what daytime temperatures?\
10. Warm season grasses favor what daytime temperatures?
11. Turfgrass growth in large _____ has increased the probability of insect/disease infestation.
12. List the information contained on a Seed Analysis Label. Define each listing.
13. What is a Mixture?
14. What is a Blend?
15. Describe the following methods of installation:
    - Seeding
    - Sodding

- Plugging
- Sprigging and Stolonizing

16. What is a Cultipacker? What is a Hydroseeder?
17. Define the following Maintenance Terms:
    - Thatch
    - Aeration
    - Vertical mowing
18. Why are turfgrasses the first plants to suffer from lack of water?
19. When watering, moisture should penetrate the soil _____ to _____ inches deep.
20. When is the best time of day to water lawns?
21. Watering in the evening should be avoided because of the danger of _____; the lawn should have time to dry before the _____ _____.

8) Techniques of Plant Propagation

1. The media for propagation must create an environment for the cutting base that will: (list six)
2. The propagation media will usually contain one or more of the following materials:
3. Field and bench soils must be of _____ texture and well _____. Both may require the addition of sand or _____ for _____, _____ retention, and _____.
4. Propagation structures must possess the following four characteristics:
5. Plant propagation requires higher _____ and greater _____ than general crop culture.
6. Define the following words related to Propagation by Seeds:
    - Scarification
    - Stratification
    - After-ripening
    - Double dormancy
    - Cotyledons
    - Hardening off
7. The eight factors of good seed production are:
8. What are plugs?

9. What are cuttings?
10. Give 3 facts about cuttings (taken from under the heading "Propagation by Cuttings" before the list of bullet points).
11. What is polarity?
12. How are better results obtained when a species is difficult to root?
13. What is a Plant Graft?
14. List and describe four plant graft parts:
15. Define the following words related to grafting:
    - Callus
    - Compatible graft
    - Incompatible graft
    - Delayed incompatibility
16. What is budding?
17. What is layering?
18. List and briefly describe five Methods of Layering:
19. What is Tissue and Organ Culturing?
20. A tissue culture is transferred to a _____ nutrient material in either a _____ or a gelatinous _____ state.
21. Which propagation technique is the newest?

9) Greenhouses and Other Growing Structures

1. What are the three purposes of a greenhouse?
2. Fill in the following descriptions for Types of Greenhouse Structures:
    - Detached A-Frame: _____ environmental control; _____ structure; _____ expensive to build and heat; _____ land between houses.
    - Ridge and Furrow: _____ expensive to build due to lack of interior _____; _____ environmental control; _____ expensive to heat.
    - Quonset: _____ expensive to build; ideal for production of _____crops; requires new _____ every year.
    - Lath or shade house: provides a _____ area for production of heat sensitive plants.

- Cold frame or hotbed: a low growing structure that _____ solar energy with decomposing manure, _____ cables, and heating _____; used for propagation, starting, and _____.

3. List eight common types of greenhouse materials used to cover growing structures:
4. Greenhouse _____ systems bring fresh air into the greenhouse to replace the warm internal air. During especially _____ weather, ventilation alone _____ _____ be enough.
5. What is Fan and pad cooling?
6. What is Fog evaporative cooling?
7. Name one advantage and one disadvantage of covering the plastic greenhouse with 2 layers of plastic instead of one and inflating the air space in between.
8. Which wall is an energy liability: North, South, East, or West? Why?
9. Most of the heat loss in a greenhouse occurs _____ _____; hence, that is when _____ consumption is greatest.
10. Greenhouse benches must fulfill what three functions?
11. Name 2 examples of crops that are grown on ground beds.
12. Name 2 examples of crops that are grown on raised benches.
13. What are 2 advantages to raising the bench above ground?
14. What are 5 common bench materials?
15. What 2 types of wood are recommended for bench use?
16. Define and give the characteristics, in detail, of the following bench arrangements:
    - Cross-bench arrangement
    - Peninsular benching
    - Length of house benching

10) Greenhouse Production Techniques

1. The production of greenhouse crops can be compared to the manufacturer of non-plant items in one way: _____ is important. _____ is everything in the flower production business.
2. What is pasteurization?
3. What soil temperature kills microorganisms?
4. Growers need soil tests for what 3 main reasons?

5. Define the following greenhouse containers:
    - Pots
    - Clay containers
    - Plastic containers
    - Peat pots
    - Hanging baskets
    - Flats
6. In Reproduction methods, seeds are used for the production of _____ plants and _____. Bulbs are used for flowering perennials like _____, _____, _____, and _____. Grafting is used for some _____. Budding is used for _____. The most common methods of reproduction used by greenhouse growers are _____ and _____.
7. What is labeling?
8. What is irrigation?
9. The first and most difficult thing that a new greenhouse worker must learn is how to _____ plants correctly.
10. Define the types of watering systems:
    - Breakers
    - Foggers
    - Spray systems
    - Trickle systems
    - Capillary mat
    - Ebb and flood irrigation
11. _____ fertilizer is used more efficiently by the plant with less loss through leaching than applied in liquid form.
12. What is the most common means of applying liquid fertilizer?
13. What is ppm? How is ppm determined?
14. What do growth retardants regulate?
15. Define the following words related to pest control:
    - Exclusion
    - Eradication
    - Protection
    - Resistance

16. Define the following common forms of greenhouse pesticides:
    - Systemics
    - Sprays (foliage sprays)
    - Dusts
    - Aerosol bombs
    - Smoke fumigants
    - Steam line vaporizers
    - Foggers
    - Misters

17. A grower can determine whether to increase or decrease the number of plants grown each year by keeping _____ _____.

11) Beginning and Promoting Ornamental Horticulture Business

1. For those who do operate or seek to operate their own business, a desire for one or more of the following may be the motive (list five):
2. The advantages of non-ownership include (list three):
3. Who sets the business tone for the way that customers and employees are treated?
4. Define and list major details of the following forms of Business Organization:
    - Sole Proprietorship
    - Partnership
        - Modern Partnership
        - Classic Partnership
    - Corporation
        - Private Corporation
        - Closed Corporation
5. What is a Market?
6. What is Capital?
7. What are two reasons that Capital is needed? Give examples of each reason.
8. What are two reasons that you should use your personal savings as much as possible in starting a new business?
9. List three important facts about 'Borrowing the Money.'

10. Describe the following kinds of loans:
    - Character or Signature Loans
    - Term Loans
    - Accounts Receivable Loans
    - Loans on Life Insurance
    - Limited Partnership Loans
    - Contract Growing Loans

11. List and briefly describe the 9 factors of selecting the business site:
12. When building the inventory, what is the best way to begin the purchase of materials and supplies?
13. List 3 costs when budgeting for inventory items.
14. Describe the purpose of following Laws and Regulations affecting horticulturalists:
    - Occupational Safety and Health Act
    - Pesticide Application Certification, or Environmental Pesticide Control Act
    - Plant Patent Act
    - Plant Pest Act

15. What is the purpose of advertising?
16. List and define the 2 types of advertising.
17. Give 5 examples of wasted advertising dollars.
18. Define Promotion.
19. Define Publicity / Public Relations.
20. List nine techniques that make in-store displays successful.

12) Human Relations: Personnel Management and Customer Sales

1. Define Personnel Management.
2. List and briefly describe the nine Qualities of Good Leadership:
3. List and briefly describe the seven Qualities to Avoid in a Leader:
4. The _____ keep the business in existence.
5. List the six Characteristics of Good Salespeople: